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Indian Standard

METHODS FOR TESTING COTTON FABRICS FOR RESISTANCE TO ATTACK BY MICRO-ORGANISMS

(First Revision)

UDC 677·21·064 : 677·017·86

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 4

August 1984

Indian Standard

METHODS FOR TESTING COTTON FABRICS FOR RESISTANCE TO ATTACK BY MICRO-ORGANISMS

(*First Revision*)

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Indian Standard

METHODS FOR TESTING COTTON FABRICS FOR RESISTANCE TO ATTACK BY MICRO-ORGANISMS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 23 March 1984, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 This standard was first published in 1959. It has now been revised to make it up-to-date on the basis of the experience gained during its use. In this revision, requirements for conditioning of specimens before breaking load tests and pre-drying of specimens at 50 to 60°C before conditioning for the breaking load test in the soil burial method, and a criterion to distinguish light weight and heavy weight fabrics for the purpose of deciding incubation time have been added. Besides, references given in the old standard have been made up-to-date.

0.3 Cotton fabrics are liable to deterioration by the action of micro-organisms. Since they are often stored, transported and used under conditions favourable for the growth of micro-organisms, various protective treatments have been developed and their number is constantly increasing.

0.4 Four different accelerated mildew infection methods and a soil burial method for testing cotton fabrics for resistance to attack by micro-organisms have been prescribed in this standard. The accelerated mildew infection methods are the humidity chamber method, pure culture method, mixed culture method and *Aspergillus niger* method. The humidity chamber method is intended for determining qualitatively the susceptibility of the fabric to the growth of micro-organisms associated with attack on cellulose. The pure culture and mixed culture methods are intended for testing quantitatively the resistance of the fabric to fungal attack by infecting the fabric with micro-organisms capable of destroying cellulose. The *Aspergillus niger* method is intended for assessing the resistance of waterproofed fabrics to the fungus *Aspergillus niger*, typical of those capable of destroying waterproofness. The soil burial method is intended for assessing the behaviour of the fabric under conditions of contact with damp soil for a long period.

0.5 Two alternative methods for determining the waterproofness of fabric have been provided, namely, the method for measuring water absorption and penetration in water-resistant fabrics (permeable to air) by Bundesmann type apparatus, as laid down in IS : 392-1975*, and the static pressure head test as laid down in IS : 7940-1976†. In the method prescribed in IS : 392-1975*, the specimen under test is subjected to falling water drops simulating tropical rain of controlled intensity and to a rubbing action on the under surface; the assessment is made by determining: (a) the resistance to actual wetting as measured by the increase in mass of the specimen, and (b) the extent to which the specimen resists passage of water under the prescribed conditions of test. In the static pressure head test laid down in IS : 7940-1976†, the test specimen is subjected to a constant hydrostatic pressure and the leakage of water through the specimen is measured.

0.6 Cultures of the organisms prescribed in this standard for the test can be obtained from the Defence Materials & Stores Research and Development Establishment, Post Box No. 320, Kanpur 208013. To facilitate supply, the culture numbers as set out below may also be mentioned:

Micro-organism	*Kanpur Culture No.*
Aspergillus niger	51
Chaetomium globosum	6
Rhizopus stolonifer	39
Memnoniella echinata	119
Helminthosporium sp	27
Pullularia pullulans	45
Myrothecium verrucaria	159
Aspergillus japonicus	185
Curvularia lunata	362
Penicillium pinophilum	364

0.7 The methods prescribed in this standard can also be used for evaluating preservatives or treatments designed to protect cotton fabrics from damage by micro-organisms. In such cases, the preservative or the treatment has to be applied to a uniformly good quality cotton fabric by the procedure recommended by the supplier or the originator, and the treated fabric then tested.

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*Method for determining water absorption and penetration of fabrics using Bundesmann type apparatus (*second revision*).

†Method for determining resistance to penetration by water of fabrics by static pressure head test.

0.8 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes methods for evaluating cotton fabrics for resistance to attack by micro-organisms.

2. ATMOSPHERIC CONDITIONS FOR CONDITIONING AND TESTING

2.1 The tests shall be carried out under the conditions laid down in the respective test procedures. However, the specimens for breaking load testing shall be conditioned and tested in the standard atmosphere at 65 ± 2 percent relative humidity and 27 ± 2°C temperature (*see* IS : 6359-1971†).

2.2 When the specimens have been left in such an atmosphere for 24 hours in such a way as to expose, as far as possible, all portions of the specimens to the atmosphere, they shall be deemed to have reached moisture equilibrium.

3. SAMPLING

3.1 Lot — The quantity of similar cotton fabric delivered to a buyer against one despatch note shall constitute a lot.

3.2 Samples shall be drawn so as to be representative of the lot. Samples drawn in accordance with the material specification or as agreed to between the buyer and the seller shall be taken as representative of the lot.

3.3 Take a sufficiently long piece (*see* Note 1) from each sample selected and mark it to identify it as a test sample. Similarly take a sufficiently long piece from the basic fabric (*see* Notes 2, 3 and 4) and mark it to identify it as the control sample.

NOTE 1 — The total length of the test samples will depend on their width, but it should be sufficient for the number of test specimens required for **4.1, 4.2, 4.3, 4.4** and **5**.

NOTE 2 — The length of the control sample will depend on its width, but it should be sufficient for the number of control specimens required for **4.1, 4.2**, **4.3** and **5**.

NOTE 3 — If an authentic sample of the basic fabric is not available, a fabric similar in construction to the one under test and free from size and finish should be used.

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*Rules for rounding off numerical values (*revised*).

†Method for conditioning of textiles.

NOTE 4 — If it is known that the fabric under test has not been treated with a preservative, a sufficiently long piece from a well-scoured cotton fabric shall be taken as the basic fabric. The mass/m² of this fabric shall not vary by more than 20 percent of the mass of the fabric under test.

NOTE 5 — If information as to whether the fabric was treated with a preservative containing copper or mercury or both is not available, the fabric should be tested for the presence of copper and mercury by the usual chemical tests.

4. ACCELERATED MILDEW INFECTION METHODS

4.1 Humidity Chamber Method

4.1.1 *Apparatus*

4.1.1.1 *Humidity chamber* — with inside measurements 70 × 80 × 70 cm, lined on the inside with a non-corrosive material, and provided with shelves, arrangements to maintain relative humidity of 98 ± 2 percent at 30 ± 2°C and, preferably, a fan for air circulation.

4.1.1.2 *Petri dishes* — 12, each 15 cm in diameter, without cover.

4.1.2 *Test Organisms* — Cultures of the following organisms:

a) *Aspergillus niger*,
b) *Chaetomium globosum*,
c) *Rhizopus stolonifer*,
d) *Memnoniella echinata*,
e) *Helminthosporium* sp, *and*
f) *Pullularia pullulans*.

4.1.3 *Procedure*

4.1.3.1 From the test samples, cut at random 6 test specimens, each of size 10 × 5 cm, with their longer sides parallel to warp threads.

4.1.3.2 Prepare, in the manner prescribed in Appendix A, a mixed suspension of the spores of the test organisms prescribed in **4.1.2**.

4.1.3.3 Take 6 petri dishes and place 1 test specimen in each dish. Inoculate each specimen (*see* **4.1.3.4**) with 2 ml of the mixed spore suspension. Lay the petri dishes on the shelves and leave them for 14 days inside the humidity chamber maintained at 98 ± 2 percent relative humidity and 30 ± 2°C temperature. At the end of the period, remove the specimens and evaluate the degree of fungal growth on each specimen in terms of ratings as given in Table 1.

4.1.3.4 From the control sample, cut at random 6 control specimens, each of size 10 × 5 cm with their longer sides parallel to warp threads. Side by side with the test on test specimens, test the control specimens according to the procedure set out in **4.1.3.3** for test specimens.

TABLE 1 DEGREE OF FUNGAL GROWTH

(*Clauses* 4.1.3.3 *and* 4.4.3.3)

SYMBOLIC RATING (1)	STATE OF GROWTH OF MICRO-ORGANISMS (2)	RATING IN TERMS OF RESISTANCE (3)
–	No growth	Good
+	Slight growth (area of growth less than one-fourth)	Fair
++	Moderate growth (area of growth more than one-fourth but less than half)	Poor
+++	Heavy growth (area of growth more than half)	Very poor

4.1.3.5 The rating for the control specimens shall be 'very poor', that is, the control specimens should show heavy mould growth; if not, the test shall be considered inconclusive and shall be repeated.

4.1.3.6 Report the rating in terms of resistance of the fabric under test to attack by micro-organisms.

4.2 Pure Culture Method

4.2.1 *Apparatus*

4.2.1.1 *Petri dishes* — 15, each 15 cm in diameter.

4.2.1.2 *Atomizer* — 10-ml capacity.

4.2.2 *Test Organism* — Culture of *Chaetomium globosum.*

NOTE — If the material under test has been treated with a preservative containing mercury or copper or both (*see* Note 5 *under* **3.3**), culture of *Myrothecium verrucaria* should be used instead of *Chaetomium globosum.*

4.2.3 *Test Medium* — Mix together the following in 1 000 ml of distilled water and sterilize with steam at a pressure of 108 kPa (1·1 kg/cm^2) for 20 minutes:

Ammonium nitrate	3·00 g
Potassium dihydrogen phosphate	0·25 g
Magnesium sulphate	0·25 g
Potassium chloride	0·25 g
Agar-agar	5·00 g

NOTE 1 — Only pure chemicals shall be used for preparing the medium. 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of test.

NOTE 2 — The *p*H of the medium should be 6·4.

4.2.4 *Procedure*

4.2.4.1 From the test samples, cut at random 15 test specimens, each of size 27 × 6·5 cm, with their longer sides parallel to warp threads. Take 5 test specimens, condition them to moisture equilibrium in the standard atmosphere (*see* **2**) and determine the breaking load of each specimen by the method prescribed in IS : 1969-1968*. Find the average of all the values.

4.2.4.2 From the control sample, cut at random 10 control specimens, each of size 27 × 6·5 cm, with their longer sides parallel to warp threads. Take 5 control specimens, condition them to moisture equilibrium in the standard atmosphere (*see* **2**) and determine the breaking load of each specimen by the method prescribed in IS : 1969-1968*. Find the average of all the values.

4.2.4.3 Prepare, in the manner prescribed in Appendix A, a suspension of the spores of the test organism prescribed in **4.2.2**.

4.2.4.4 Out of the remaining 10 test specimens, take 5 specimens.

4.2.4.5 Sterilize the specimens in the manner prescribed in Appendix B and with sterile instruments. Transfer them to 5 sterile petri dishes, each containing 50 ml of the test medium. Roll up the two ends of each specimen so that about 13 cm of its central portion is left exposed. Inoculate the exposed portion of each specimen under sterile conditions by spraying with 2 ml of the suspension prepared as in **4.2.4.3** by means of the atomizer. Incubate the specimens for 14 days at 98 ± 2 percent relative humidity and 30 ± 2°C temperature. At the end of the period, remove the specimens and wash them with cold water until they are free from agar. Dry the specimens in air, condition them to moisture equilibrium in the standard atmosphere (*see* **2**) and determine the breaking load of each by the method prescribed in IS : 1969-1968*. Find the average of all the values.

4.2.4.6 Leach the remaining 5 test specimens in the manner prescribed in Appendix C and test them in the manner prescribed in **4.2.4.5**.

4.2.4.7 Test the remaining 5 control specimens in the manner prescribed in **4.2.4.5**.

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*Method for determination of breaking load and elongation at break of woven textile fabrics (*first revision*).

4.2.4.8 Calculate the loss in breaking load, percent, of the basic fabric on incubation (L) by the following formula:

$$L = \frac{100\,(a - b)}{a}$$

where

a = average breaking load value obtained as in **4.2.4.2**, and
b = average breaking load value obtained as in **4.2.4.7**.

If the value of L is less than 90 percent, the test shall be repeated.

4.2.4.9 Calculate in the manner prescribed in **4.2.4.8** the loss in breaking load, percent, of the fabric under test on incubation prior to leaching, equating to:

'a' the value obtained as in **4.2.4.1**, and
'b' the value obtained as in **4.2.4.5**.

NOTE — The fabric should be considered satisfactorily resistant to attack by micro-organisms if the value of L does not exceed 10 percent.

4.2.4.10 Calculate in the manner prescribed in **4.2.4.8** the loss in breaking load, percent, of the fabric under test on incubation after leaching, equating to:

'a' the value obtained as in **4.2.4.1**, and
'b' the value obtained as in **4.2.4.6**.

NOTE — The fabric should be considered satisfactorily resistant to attack by micro-organisms if the value of L does not exceed 10 percent.

4.2.4.11 Report the following:

a) Loss in breaking load, percent, of the basic fabric on incubation (*see* **4.2.4.8**);
b) Loss in breaking load, percent, of the fabric under test on incubation prior to leaching (*see* **4.2.4.9**); and
c) Loss in breaking load, percent, of the fabric under test on incubation after leaching (*see* **4.2.4.10**).

4.3 Mixed Culture Method

4.3.1 *Apparatus* — Same as in **4.2.1**.

4.3.2 *Test Organisms* — Cultures of the following organisms:

a) *Aspergillus japonicus*
b) *Curvularia lunata, and*
c) *Penicillium pinopnilum.*

4.3.3 *Test Medium* — Same as in **4.2.3**.

4.3.4 *Procedure* — Follow the procedure prescribed in **4.2.4**, except that:

a) for the purpose of **4.2.4.3**, prepare (instead of a suspension of the spores of *Chaetomium globosum*) a mixed suspension of the spores of the test organisms prescribed in **4.3.2**; and

b) for the purpose of **4.2.4.5**, use (instead of a suspension of the spores of *Chaetomium globosum*) a mixed suspension as prescribed in (a) above.

4.4 *Aspergillus Niger* Method

4.4.1 *Apparatus*

4.4.1.1 *Petri dishes* — 6, each 15 cm in diameter.

4.4.1.2 *Atomizer* — 10-ml capacity.

4.4.2 *Test Organism* — Culture of *Aspergillus niger*.

4.4.3 *Procedure*

4.4.3.1 From the test samples, cut at random 9 test specimens in the form of 13 cm diameter discs.

4.4.3.2 Take 3 test specimens and determine their waterproofness in accordance with IS : 392-1975* or IS : 7940-1976†.

If the waterproofness test is made as prescribed in IS : 392-1975*, determine for each specimen:

a) the percentage of absorption of water; and

b) the penetration, in millilitres, of water.

Find the average values.

If the waterproofness test is made as prescribed in IS : 7940-1976†, determine the leakage of water, in litres per square metre per hour. Find the average value.

4.4.3.3 Take 3 test specimens from the remaining and sterilize them in the manner prescribed in Appendix B. Take 3 sterile petri dishes and put in each dish 10 ml of sterile water and filter paper of 10 cm diameter. With sterile instruments, transfer the specimens to the petri dishes.

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*Method for determining water absorption and penetration of fabrics using Bundesmann type apparatus (*second revision*).

†Method for determining resistance to penetration by water of fabrics by static pressure head test.

Inoculate each specimen by spraying with 2 ml of the suspension of the spores of *Aspergillus niger* prepared according to Appendix A by means of the atomizer. Incubate the specimens for 9 days at 98 ± 2 percent relative humidity and 30 ± 2°C temperature. At the end of the period, evaluate the degree of fungal growth on each specimen in terms of ratings as given in Table 1 (*see* **4.1.3.3**).

4.4.3.4 Dry the specimens in air and determine their waterproofness by the method chosen for the purpose (*see* **4.4.3.2**).

4.4.3.5 Leach the remaining 3 test specimens in the manner prescribed in Appendix C and test them in the manner prescribed in **4.4.3.3** and **4.4.3.4**.

4.4.3.6 Report the results of the test in the form prescribed below:

	Unleached Fabric		*Leached Fabric, after biological test* (*see* **4.4.3.5**)
	Before biological test (*see* **4.4.3.2**)	*After biological test* (*see* **4.4.3.3** *and* **4.4.3.4**)	
a) Rating in terms of resistance to growth of *Aspergillus niger*			
b) Waterproofness:			
1) Absorption, percent of water and			
2) Penetration, in ml, of water			
OR			
Leakage of water in litres per square metre per hour			

NOTE — If the waterproofness test has been made by the method prescribed in IS : 392-1975*, the fabric should be considered satisfactorily resistant to attack by micro-organisms provided that:

a) the ratings obtained as in **4.4.3.3** and **4.4.3.5** are 'good';

b) the values for absorption, percent, obtained as in **4.4.3.4** and **4.4.3.5** do not exceed the corresponding value obtained as in **4.4.3.2** by more than 20 percent; and

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*Method for determining water absorption and penetration of fabrics using Bundesmann type apparatus (*second revision*).

c) the values for penetration obtained as in **4.4.3.4** and **4.4.3.5** do not exceed the corresponding value obtained as in **4.4.3.2** by more than 10 ml.

If the waterproofness test has been made in accordance with the method prescribed in IS : 7940-1976*, the fabric should be considered satisfactorily resistant to attack by micro-organisms provided that:

a) the ratings obtained as in **4.4.3.3** and **4.4.3.5** are ‘ good ’, and

b) the values for leakage obtained as in **4.4.3.4** and **4.4.3.5** do not exceed the corresponding value obtained as in **4.4.3.2** by more than 0·6 litres per square metre per hour.

5. SOIL BURIAL METHOD

5.1 Test Soil — Prepare as prescribed in Appendix D.

5.2 Procedure

5.2.1 From the test samples, cut at random 15 test specimens, each of size 27 × 6·5 cm, with their longer sides parallel to warp threads. Take 5 test specimens and test them as given in **4.2.4.1**.

5.2.2 Take 5 out of the remaining 10 test specimens.

5.2.3 Put the test soil in five 500-ml beakers and bury 1 specimen in each beaker in such a way that the ends of the specimen are free. (Except for the free ends, the rest of the specimen should be surrounded by 2·5 cm thick soil.) Incubate the specimens at 98 ± 2 percent relative humidity and 30 ± 2°C temperature for 7 days, if the fabric under test is light in weight, and for 28 days, if the fabric under test is heavy in weight (*see* Note). At the end of the period, remove the specimens, wash them free from soil, dry them for 30 minutes at 50 to 60°C, condition them to moisture equilibrium in the standard atmosphere and determine the breaking load of each by the method prescribed in IS : 1969-1968†. Find the average of all the values.

NOTE — Fabrics weighing up to 300 g/m^2 should be considered as light fabrics and more than this limit be considered as heavier fabrics to decide about the time of incubation.

5.2.4 Leach the remaining 5 test specimens in the manner prescribed in Appendix C and test them in the manner prescribed in **5.2.3**.

5.2.5 From the control sample, cut at random 10 control specimens, each of size 27 × 6·5 cm, with their longer sides parallel to warp threads. Take 5 specimens and test them as given in **4.2.4.2**.

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*Method for determining resistance to penetration by water of fabrics by static pressure head test.

†Method for determination of breaking load and elongation at break of woven textile fabrics (*first revision*).

5.2.6 Test the remaining 5 control specimens in the manner prescribed in **5.2.3**.

5.2.7 Calculate the loss in breaking load, percent, of the basic fabric on soil burial (L) by the following formula:

$$L = \frac{100\,(a - b)}{a}$$

where

a = average breaking load value obtained as in **5.2.5**, and

b = average breaking load value obtained as in **5.2.6**.

If the value of L is less than 90 percent, the test shall be repeated.

5.2.8 Calculate in the manner prescribed in **5.2.7** the loss in breaking load, percent, of the fabric under test on soil burial prior to leaching, equating to:

'a' the value obtained as in **5.2.1**, and

'b' the value obtained as in **5.2.3**.

NOTE — The fabric should be considered satisfactorily resistant to attack by micro-organisms if the value of L does not exceed 10 percent.

5.2.9 Calculate in the manner prescribed in **5.2.7** the loss in breaking load, percent, of the fabric under test on soil burial after leaching, equating to:

'a' the value obtained as in **5.2.1**, and

'b' the value obtained as in **5.2.4**.

NOTE — The fabric should be considered satisfactorily resistant to attack by micro-organisms if the value of L does not exceed 10 percent.

5.2.10 Report the following:

a) Loss in breaking load, percent, of the basic fabric on soil burial (*see* **5.2.7**);

b) Loss in breaking load, percent, of the fabric under test on soil burial prior to leaching (*see* **5.2.8**); and

c) Loss in breaking load, percent, of the fabric under test on soil burial after leaching (*see* **5.2.9**).

APPENDIX A

(*Clauses* 4.1.3.2, 4.2.4.3 *and* 4.4.3.3)

PREPARATION OF SPORE SUSPENSION*

A-1. CULTURE MEDIUM

A-1.1 Take about 250 g of potatoes, peel them off and cut them into slices. Weigh 200 g of the sliced potatoes, wash them in running tap water and place them in a beaker. Add 500 ml of distilled water and keep the contents at boil for 30 minutes. Filter the hot extract through a thin layer of absorbent cotton previously wetted with distilled water. Preserve the filtrate.

A-1.2 Take 25 g of agar, cut it into small pieces and boil, in the minimum quantity of distilled water necessary, till no solid agar is visible. Add 20 g of dextrose and mix it with the filtrate (*see* **A-1.1**). Make up the volume to 1 000 ml with hot distilled water. Adjust the *p*H of the culture medium to 6·4.

NOTE — To avoid solidification, the temperature of the culture medium should be kept above 45°C.

A-1.3 Put 5 ml of the culture medium into each of a number of 15 × 2 cm test tubes and plug them with non-absorbent cotton-wool. In an autoclave, sterilize the culture medium with steam at a pressure of 108 kPa (1·1 kg/cm^2) for 20 minutes. At the end of the period, remove the test tubes from the autoclave, place them in a slanting position and allow them to cool to harden the culture medium into slants.

A-2. SUB-CULTURE

A-2.1 Inoculate the slants in the test tubes with a well-sporulated culture of the test organism (*see* **4.1.2**, **4.2.2**, **4.3.2** and **4.4.2**) by means of a sterile needle. Incubate the slants for 7 days at 30 ± 2°C.

NOTE — At the end of this period, a heavy growth of the freshly sporulating test organism should be visible within the tubes.

A-3. PREPARATION

A-3.1 Add about 10 ml of sterile distilled water to freshly sporulating sub-culture of the test organism (*see* **A-2**) within the tubes. Bring the spores of the sub-culture into suspension by shaking or disturbing them gently with a sterile glass rod. Filter the suspension through a sterile muslin or similar fabric to remove particles of agar or fungal mycelium. Examine a drop of the spore suspension under a low-power microscope, and see whether 50 or more spores appear in the field.

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*If a mixed suspension of the spores of more than one test organism is to be prepared, the suspension of the spores of each test organism shall be prepared separately and the suspensions then mixed in equal volumes.

APPENDIX B

(*Clauses* 4.2.4.5 *and* 4.4.3.3)

STERILIZATION IN METHYL ALCOHOL VAPOUR

B-1. Pack the specimens loosely in a desiccator of suitable size containing methyl alcohol and keep them for 24 hours (or longer) at room temperature (about 27°C). In the meantime, make another desiccator ready by sterilizing it with methyl alcohol vapour for a period of 12 hours at room temperature. Transfer the specimens from the first desiccator to the second with a pair of sterile tongs. Connect the second desiccator to a water pump through a cotton-wool filter and exhaust the desiccator at room temperature for 6 hours to remove traces of methyl alcohol. Bring the pressure in the desiccator to the atmospheric pressure by slowly letting in air through the cotton-wool filter.

APPENDIX C

(*Clauses* 4.2.4.6, 4.4.3.5 *and* 5.2.4)

METHOD OF LEACHING

C-1. Place the specimen inside a glass jar with internal diameter of 9 cm. Through a capillary extending to within 0·6 cm of the bottom of the jar, allow water (with *p*H of not less than 6·0 and not more than 8·0 and at a temperature of 30 ± 2°C) to flow into it at the rate of 10 litres per hour. In this stream of water leach the specimen for 24 hours.

APPENDIX D

(*Clause* 5.1)

PREPARATION OF TEST SOIL

D-1. Mix thoroughly:

a) a layer of good, sandy loam soil, 13 cm thick;

b) a layer of fresh cow-dung manure, 7·5 cm thick; and

c) a layer of finely chopped straw, 15 cm thick.

Allow the mixture to ferment for 2 months, turning it once a week and maintaining the moisture content at 22 to 25 percent on the total mass of the mixture. At the end of the period, put the resulting compost through 300-µm IS Sieve [*see* IS : 460 (Part 1)-1978*] and test it in the manner prescribed in **D-1.1** to **D-1.5**.

D-1.1 Take a light-weight cotton fabric weighing 240 to 255 g/m^2 and draw from it 6 pieces, each of size 20 × 5 cm.

D-1.2 Take three pieces of the fabric and determine the breaking load of each by the method prescribed in IS : 1969-1968†. Find the average of all the values.

D-1.3 Bury the remaining 3 pieces of the fabric in the compost for 5 days. At the end of this period, remove the pieces from the compost and determine the breaking load of each by the method prescribed in IS : 1969-1968†. Find the average of all the values.

D-1.4 Calculate the loss in breaking load, percent, of the fabric after soil burial.

D-1.5 The soil shall be deemed to be suitable for the test if the loss in breaking load of the fabric, so determined, is 80 percent or more.

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*Specification for test sieves: Part 1 Wire cloth test sieves (*second revision*).

†Method for determination of breaking load and elongation at break of woven textile fabrics (*first revision*).

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 26 60 21, 27 01 31 **Telegrams : Manaksanstha**

Regional Offices:

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Printed at Printograph, New Delhi, India